DOCUMENT RESUME

ED 482 073 IR 058 759

AUTHOR	Anable, Susan; Alonzo, Adam
TITLE	Accessibility Techniques for Museum Web Sites.
PUB DATE	2001-00-00
NOTE	14p.; In: Museums and the Web 2001: Selected Papers from an International Conference (5th, Seattle, Washington, March 15-17, 2001); see IR 058 756.
AVAILABLE FROM	Archives & Museum Informatics, 2008 Murray Ave., Suite D, Pittsburgh, PA 15217; e-mail: info@archimuse.com; Web site: http://www.archimuse.com/. For full text: http://www.archimuse.com/mw2001/.
PUB TYPE	Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE	EDRS Price MF01/PC01 Plus Postage.
DESCRIPTORS	*Accessibility (for Disabled); Cooperative Programs; Design; Disabilities; Internet; *Museums; Web Sites
IDENTIFIERS	Access to Facilities; *Virtual Museums; *Web Site Design

ABSTRACT

Like other public institutions, museums strive to make their facilities accessible to people with disabilities, yet these same patrons may be hindered in their use of museum Web sites by electronic accessibility barriers. This presentation demonstrates that access was a primary design factor in the Virtual Museum Tour, part of the Web site of The Dayton Art Institute. Developed in collaboration with Wright State University (Ohio),planners of the Virtual Museum Tour" faced the challenge of making a variety of Internet technologies accessible to people with visual or hearing impairment or mobility limitations. By adopting a set of Web accessibility guidelines and utilizing them in creative ways, the Virtual Museum Tour provides an enlightening art experience for all visitors. Includes seven figures. (Author)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 482 073

Accessibility Techniques For Museum Web Sites

Susan Anable, The Dayton Art Institute and Adam Alonzo, Wright State University, USA

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

D. Bearman

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

Minor changes have been made to improve reproduction quality.

Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Register
Workshops
Sessions
Speakers
Interactions
Demonstrations
Exhibits
Events
Best of the Web
Key Dates
Seattle
Sponsors

A&MI

Archives & Museum Informatics
2008 Murray Ave
Suite D
Pittsburgh, PA
15217 USA
info@archimuse.com
www.archimuse.com

Search A&MI

Join our Mailing List

Privacy

Updated: 02/27/2001 11:23:58

Abstract

Like other public institutions, museums strive to make their facilities accessible to people with disabilities, yet these same patrons may be hindered in their use of museum Web sites by electronic accessibility barriers. This presentation will demonstrate that access was a primary design factor in the Virtual Museum Tour, part of the Web site of The Dayton Art Institute. Developed in collaboration with Wright State University, planners of the Virtual Museum Tour faced the challenge of making a variety of Internet technologies accessible to people with visual or hearing impairment or mobility limitations. By adopting a set of Web accessibility guidelines and utilizing them in creative ways, the Virtual Museum Tour provides an enlightening art experience for all visitors.

Introduction

The Dayton Art Institute has served residents of southwestern Ohio since 1919. The museum operates on the premise that art is for everyone, and provides the community with free general admission 365 days a year. In addition, the Art Institute's physical facility is free of architectural barriers that might prevent people with disabilities from accessing exhibitions or participating in programs. Rated "superb in quality" by the American Association of Museums, The Dayton Art Institute has one of the finest mid-size museum collections in the country. As the Art Institute began to make this Collection available on the World Wide Web, the same commitment to barrier-free access was demonstrated.

The Virtual Museum Tour is an interactive learning environment for Web visitors to explore The Dayton Art Institute (http://www.daytonartinstitute.org/). The Tour came about through a collaboration between the Art Institute and Wright State University (http://www.wright.edu/), located in Dayton and known for its outstanding support program for students with disabilities. One of the primary goals of this project was to provide Web visitors with an informative and absorbing experience equal to or better than what they might have in the Museum's actual galleries. This naturally implied the inclusion of visual and auditory technologies to enhance the visitor's examination of works of art. Yet the Tour also needed to be as accessible as possible for everyone, including people with disabilities, as prescribed by the U. S. Department of Education grant that funded the development of the Tour. Although the idea of accessibility may seem incongruous to a Web site enriched with images and sounds, it is not impossible. Through

IR058759

BEST COPY AVAILABLE

cooperation and creativity, the project partners were able to achieve both objectives.

One important factor that had to be determined early in the project was the definition of accessibility as it pertains to a Web site. There is a great deal of information about the topic available from books, Web sites and conferences, but the recommendations given by these sources do not always concur. Fortunately, a single authoritative source has emerged from the World Wide Web Consortium, the international body that leads the development of the Web. The Web Accessibility Initiative (WAI) within that organization has published a set of fourteen Web Content Accessibility Guidelines (http://www.w3.org/TR/WAI-WEBCONTENT/) to help designers create accessible sites. Developed through a process of extensive research and review by a team of experts, the WAI Guidelines were adopted as the accessibility standard for the Virtual Museum Tour project.

Because the WAI Guidelines are designed to be universal in scope, they do not specifically address the needs of unique audiences such as museums. As a result, they often require interpretation or simplification in order to be applied. This paper documents how the Guidelines were implemented in practical ways on the Virtual Museum Tour, thereby creating a type of accessibility style guide suitable for other museum Web site designers. Due to the limitations of this paper, only a few of the fourteen Guidelines can be addressed, but more extensive information about accessibility techniques will be available on the Virtual Museum Tour site itself.

Accessibility Techniques

Among the fourteen WAI Guidelines, there are a few which have particular relevance to museum Web sites. These are listed in the sections below, along with the techniques used to implement them on the Virtual Museum Tour.

Guideline 1. Provide equivalent alternatives to auditory and visual content.

Provide content that, when presented to the user, has conveys essentially the same function or purpose as auditory or visual content.

This is perhaps the most basic of the fourteen Guidelines, but it is also the most important. The Web in general, and museum sites in particular, rely heavily upon images to convey information; audio content is also found on many Web sites. But people with visual or hearing impairments may be unable to perceive multimedia features such as images, sounds or video. If a Web page includes equivalent alternatives, however, all Web visitors will be able to experience to some degree the content conveyed by these visual and auditory elements. Equivalent alternatives frequently take the form of text, which is the most broadly accessible type of content available on the Web. It is important to note that Guideline 1 does not prohibit the use of multimedia such as images and sounds, but rather suggests how to convey that content in different ways so all users can understand its meaning.

Audio

The Virtual Museum Tour contains a large number of audio clips, spoken by various commentators, containing information about works. In order to implement Guideline 1, each narration is accompanied by a text transcript. All of the recordings were carefully transcribed to ensure that the speaker's exact words were accurately rendered into text (including sentence fragments and grammatical errors), and to ensure that names, places and terms were spelled correctly.

A typical audio segment on the Tour contains the comments of Alexander Lee Nyerges, Director of The Dayton Art Institute, recounting how the Museum acquired the painting *Waterlilies* by Claude Monet (Fig. 1). The excerpt below shows how the transcript captures the conversational style of the narration, and also demonstrates the need for accuracy in transcribing names and places.

> "It really isn't 'til you get to Monet's highest points, his series which include his series of *Waterlilies*, that we find the fully developed and fully mature essence of what we now regard as classical Impressionism. This was done in his garden in 1903, and probably represents the highest point of his entire *Waterlilies* series. This work was given to the Art Institute by a gentleman by the name of Mr. Joseph Rubin, who ran a company in New York City called the Loma Dress Corporation. And sometime before 1953, Dr. Esther Seaver, who was the Director of The Dayton Art Institute in the first part of the 1950s, had encountered this picture and was acquainted with a dealer in New York by the name of Silberman . . . "

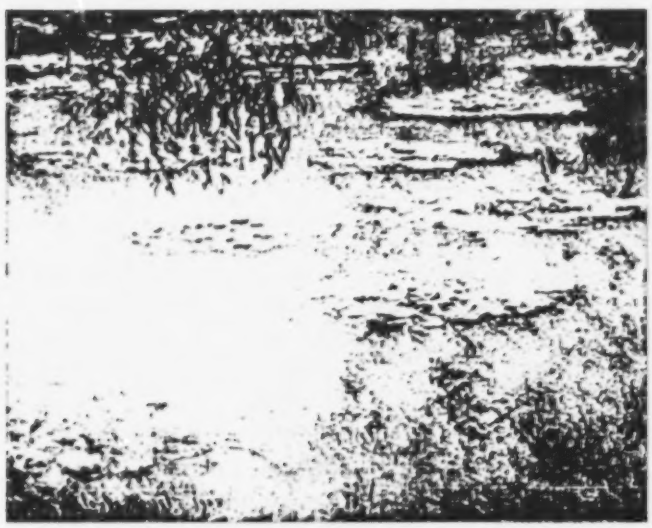

Fig. 1: Claude Monet (1840-1926) French, WATERLILIES, 1903, Oil on canvas, 32 x 40 inches, Gift of Mr. Joseph Rubin, 1953.11

When incorporated within the Virtual Museum Tour, text transcripts are provided alongside the audio clip itself, so Web visitors can choose the format that is appropriate for them. They can select either a link that plays the recording or a link that leads to the transcript on another page. In this manner, the two formats appear truly equivalent, since one is not presented as subordinate to the other.

Although not applicable to the Virtual Museum Tour, it may be necessary to expand text transcripts if there is meaning conveyed by more than just the words themselves. For instance, if an audio clip contains music or sound effects, these should be briefly described in the transcript. In addition, if the tone of voice is significant, or the speaker is portraying a particular character, this may also be alluded to in the transcript

Images

In addition to audio, Guideline 1 also applies to visual content such as images, certainly the most common medium found on the Web. In the context of a museum Web site, images can be roughly categorized into two types: simple graphics such as logos, and complex pictures of artwork. Depending upon their type, two different approaches may be used to provide equivalent alternatives to images.

Simple graphics can be dealt with relatively easily by taking advantage of a feature of Hypertext Markup Language (HTML), the language that controls the format and function of Web pages. To place an image on a Web page, a designer inserts a particular HTML element into the document; this element is referred to as an "image tag" and appears as a three-letter abbreviation between brackets.

```
<img>
```

In addition to this term, another statement (called an "attribute") must be placed inside the brackets. This attribute indicates the filename or "source" of the image; it too is abbreviated.

```
<img src = "filename">
```

While no further information is required to produce a visible image on the page, there are several optional attributes that may be used to control properties of the image such as its size and its relation to surrounding screen elements. One such optional attribute can be added to provide a text alternative that briefly describes what the image is. The alternative attribute is also abbreviated, and is used alongside the source attribute within the same image tag.

```
<img src = "filename" alt = "description">
```

Text alternatives are not captions that appear alongside the image, and in most cases they will not even be visible on the page. However, there are several ways in which they benefit visitors, particularly those with visual impairments. Web visitors who are blind typically use specialized computer software and hardware that reads pages aloud to them. If a Web page includes text alternatives, they too will be vocalized, informing users about the images found on the page. Without text alternatives, users will not know what the images are or why they are there. Further information on the use of text alternatives is available from the World Wide Web Consortium (http://www.w3.org/TR/html4/struct/objects.html#adef-alt).

Every image on the Virtual Museum Tour is accompanied by a text alternative that is generally no more than a few words in length. Because of their brevity, text alternatives are not used to describe the

appearance of images, but simply to identify what they are. For example, the following line of HTML code could be used to identify the Art Institute's logo (Fig. 2):

<img src = "logo.gif" alt = "The Dayton Art Institute logo">

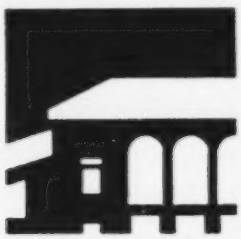

Fig. 2: The Dayton Art Institute logo

For simple graphics such as a logo, a brief text alternative may be adequate, but pictures that show works of art require a more detailed visual description. Visual descriptions are short paragraphs that verbally describe the appearance of images for the benefit of Web visitors who are unable to see them. They serve the same role in the visual arts as audio descriptions do for the performing arts, since both provide participants with a verbal impression of things they cannot see. The Virtual Museum Tour provides a visual description for every piece of artwork presented.

The WAI Guidelines suggest different techniques for including visual descriptions with complex images (http://www.w3.org/TR/WCAG10-HTML-TECHS/#long-descriptions), but there is currently no standard practice in use. The Virtual Museum Tour uses visual descriptions to supplement rather than replace text alternatives: a text alternative gives the title of a work while a visual description tells what it looks like. Links to visual descriptions are prominently placed on a navigation menu alongside links leading to other sources of information about the artwork, thereby presenting them as simply another resource for everyone, not just people with disabilities.

Developing quality visual descriptions is a time-consuming task that should be done thoughtfully by individuals with excellent writing and editing skills. No instructions for doing so were available during the creation of the Virtual Museum Tour, but in the course of preparing approximately 100 visual descriptions, a standard process was developed. This process is summarized in the following six Recommendations which can be applied to other Web projects that involve images of artwork.

Recommendation One: Be Objective

The sole function of a visual description is to describe the appearance of a work of art. In brief, it should simply answer the question, "What does the object look like?" Descriptions should avoid analytical interpretations or emotional responses. In other words, they should not explore questions like, "What does it mean?" or "How does it make you feel?" Descriptions help visitors to visualize an object, thereby providing a context for other information about the work found elsewhere, such as

historical background, the artist's style, or critical commentary. By combining this factual information with an objective description, Web visitors are sufficiently informed to make a personal analysis or achieve their own emotional response.

Objectivity should also be exercised when referring to characters portrayed in a painting or other work of art. Though it is appropriate to describe their appearance, clothing and actions, visual descriptions should not attempt to explain their motivations or feelings, even if these are implied by gestures or context. If the emotions of the characters are obvious in the artwork, then they will likely be apparent in the visual description as well.

In this example (Fig. 3), the description was written without references to emotion, although the mood implied by the painting may still be perceived.

> " . . . The girl's body is turned partially to her left while her head is turned to look to her right. Her brown hair is parted in the middle and pulled to the back of her head. She has heavy eyebrows, dark eyes and reddish cheeks. Her mouth is small and her red lips are closed. Both arms are extended and her hands rest on her knees with their fingers intertwined . . . "

Fig. 3: William Adolphe Bouguereau (1825-1905) French, THE

SONG OF THE NIGHTINGALE, 1895, Oil on canvas, 55 x 35 inches, Gift of Mr. Robert Badenhop, 1954.12

Finally, because artistic taste varies according to the individual, visual descriptions should not contain value judgements on the quality of the art object, nor on the skill of the artist who created it.

Recommendation Two: Be Brief

Although length will vary according to the piece of artwork being described, visual descriptions should be as brief as possible. In some settings, visual descriptions are presented as audio recordings read by a narrator. Other times they are provided as text that visitors have to read by themselves. In either case, since extremely long descriptions are tiresome, they should be limited to 250 to 300 words. Depending on the context, visual descriptions may be accompanied by catalogue data about the artwork (such as the artist's name and life span, title, medium and dimensions). If so, this information need not be included in the overall word count.

For better word economy, exclude redundant phrases like "rectangular in shape" or "blue in color." Simply use "rectangular" or "blue" instead. Likewise, avoid obvious statements such as "she wears a necklace around the neck" or "gloves on her hands."

Recommendation Three: Be Descriptive

Visual descriptions should utilize a broad vocabulary of vivid terminology to describe various features of art objects. Some common terms are categorized below.

Shapes can be described as square, cubed, rectangular, flat, straight, circular, spherical, cylindrical, curved, rounded, triangular, conical, pyramidal, angular, irregular, jagged, sloped, diagonal, horizontal and vertical. These words can be used not only to identify the overall shape of the object, but also to describe geometric patterns within it. Avoid words that imply action unless the object actually does move; for instance, "curved" is preferable to "curving." Also, colloquial terms such as "squiggle" or "zigzag" should not be used.

Size can be described as small, tiny, short, miniature, large, tall, monumental, thick, thin, narrow, wide, life-size, true to size, large scale and small scale. The object's dimensions, provided with the catalogue data, will inform visitors of its actual size.

Texture can be described as smooth, glossy, coarse, grainy, rough, worn, weathered, scratched, cracked, broken, rippled, grooved, patterned, striped, dotted and perforated.

Color can be described as intense, vivid, bright, light, dark, dull, pale, faint, solid or blended. There is no need to avoid references to color on the assumption that they will be meaningless to visitors who are blind. First of all, descriptions will be used by people without visual disabilities. Second, many people who are now blind were able to see in the past and are able to recall colors. Third, colors sometimes have symbolic meaning in works of art (although interpretive phrases like "warm gold" or "angry red" should not be used).

Composition (or the arrangement of elements in a work) can be described as low, high, above, below, parallel, perpendicular, in the foreground (or background), and to the left (or right). When referring to relative locations, describe objects from the viewer's perspective, unless referring to the left or right of a character portrayed in the work.

Artistic technique can be described as realistic, abstract, unnatural, simplified, detailed, precise, imprecise, sharply defined, blurred, splashed, brushed or stroked.

Recommendation Four: Be Logical

In order to be easily understood, visual descriptions must describe objects according to a logical sequence. Descriptions should begin with a general overview of what the object is and what it portrays. Depending upon what type of object it is, it may be appropriate at the outset to mention its color and surface texture, and perhaps its construction. Following the overview, the various portions of the object should be described in detail, in some orderly fashion such as left to right or top to bottom. After one portion of the work has been described, an explicit transition should be used to identify the next area and its spatial relationship to the last. If part of the object is extremely complex, it is best to describe each segment separately, perhaps in a numbered sequence.

In the following example (Fig. 4), the location of objects in a painting are described in relation to other elements, providing the reader with an understanding of the overall composition of the work.

> " . . . To the left of the barn is an area of crisscrossed black strokes like a shadow. Below the barn is a red and gray machine placed awkwardly on its side. Its large wheels and gears give it the appearance of a piece of farm machinery. To the right of the machine are two brown and angular tree branches that rise upward from the bottom edge of the picture. Between the branches, several small scenes are crudely rendered one above another . . . "

Fig. 4: Stuart Davis (1894-1964) American, LANDSCAPE WITH BROKEN MACHINE, 1935, Gouache on paper, 15 1/4 x 22 1/8 inches, Bequest of Virginia Rike Haswell, 1977.39

Depending on their design, sculptures or other three-dimensional works

will likely need to be described from more than one angle. A logical sequence should be used when doing so, as if the viewer was moving in a circle around the object.

When using descriptive words such as adjectives, it is often best to place them after the word they modify, so visitors know what the object is before they are told what it looks like. For example, use "his fingers are long and thin" instead of "he has long, thin fingers."

Recommendation Five: Be Accurate

Because visual descriptions are part of the overall learning experience of art patrons, they should be factual and consistent with other sources of information about the artwork. Background research may be necessary to correctly identify historical figures, religious personalities, geographical locations, types of clothing, breeds of animals, architectural elements and so on. However, descriptions should avoid jargon or specialized terminology that may be unfamiliar to most visitors. For example, the stylistic terms "abstract" and "realistic" are likely to be understood, but "Geometric Abstractionist" and "French Academic" are not.

It is strongly recommended that a describer look at the actual object when making initial notes, because color and small details are most accurately observed in person. When these notes are refined into the actual description, slides or photographs may be used as a reminder of the object's appearance and composition.

Recommendation Six: Miscellaneous

Because visitors on a virtual tour may access works of art in any order, writers of visual descriptions should not assume that readers have followed a particular sequence. References to other artwork should not be made within a visual description, not even to works by the same artist or from the same gallery.

For the benefit of Web visitors using screen reading software, numbers should be spelled out as words, as in "nineteenth century" rather than "19th century," and "two and a half" instead of "2 1/2."

Descriptions ought not to assign gender to animals, such as "the dog stands on his hind legs."

When describing the clothing of characters in a work, monotony can be minimized by using varied phrases like "dressed in," "is wearing" and "has on."

Once visual descriptions have been written and edited, several reviewers (including people with visual disabilities) should provide suggestions for improvement. As a final check, descriptions should be compared, by a team member, in person, to the actual works of art in the galleries.

Video

Although the Virtual Museum Tour currently does not contain video clips,

the principle of equivalent alternatives also applies to video. In general, it is necessary to provide synchronized captions for all spoken words, as well as descriptions for sound effects, music and visuals. Further details and examples are available at the National Center for Accessible Media (http://main.wgbh.org/wgbh/pages/ncam/richmedia/index.html).

Guideline 4. Clarify natural language usage

Use markup that facilitates pronunciation or interpretation of abbreviated or foreign text.

The purpose of this guideline is to make it easier for people using adaptive computer equipment to understand the content of Web documents, particularly those that contain periodic language changes. For example, a Web visitor who is blind will probably utilize a certain type of adaptive software called a screen reader to vocalize the words on a page. By identifying the language of the text, the screen reader may be able to respond with the proper pronunciation and accent. This technique can also benefit people who read Web pages with the aid of a Braille device, since words or characters may be displayed differently depending upon the language in use.

For a museum Web site this Guideline is crucial due to the frequent use of terminology from a variety of languages. As the Virtual Museum Tour was being developed, a large number of new documents were written, and existing documents were adapted for the site. In both cases, these catalogue entries and commentaries were closely checked, and variations in language were noted. This process was also applied to all visual descriptions and text transcripts of audio segments, which are accommodations themselves.

In order to implement Guideline 4, the primary language of a document must first be identified,; then any subsequent changes in language must be indicated. The initial step is accomplished by adding the language attribute to the opening HTML tag found at the top of the document. Instead of using the full name of a language (such as English), a two-letter abbreviation is used.

```
<html lang = "en">
```

A lengthy list of these two-letter language codes is available from the Organization for the Advancement of Structured Information Standards (http://www.oasis-open.org/cover/iso639a.html).

Once the primary language of a document is identified, changes in language that occur within the text also need to be declared. This can be done by using a pair of span container tags with the language attribute. The opening span tag marks the beginning of a new language segment while the closing tag indicates the end. After the closing span tag, the document reverts to the primary language previously declared. The following example is an excerpt from commentary written by Clarence W. Kelley about a pair of Japanese screen paintings (Fig. 5).

> " . . . By the end of the 17th century, a distinctive association had developed between classical literature and a type of screen painting known as byobu-uta (poems for screens), as

seen in this pair of screen paintings . . . "

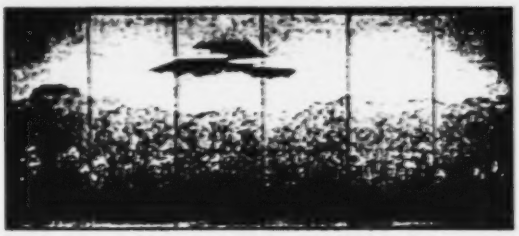

Fig. 5: Japan, Edo period (1615 - 1868) MUSASHI PLAIN, late 17th - early 18th century, Pair of six-fold screens: ink, colors and gold on paper, Each panel 66 1/2 x 24 1/4 inches, Museum purchase, 1960.24a-b

In addition to language changes, Guideline 4 also applies to the use of abbreviations and acronyms within Web documents. Further details are available from the Web Accessibility Initiative (http://www.w3.org/TR/WCAG10-HTML-TECHS/#text-abbr).

Guideline 8. Ensure direct accessibility of embedded user interfaces.

Ensure that the user interface follows principles of accessible design: device-independent access to functionality, keyboard operability, self-voicing, etc.

This Guideline refers to various Web site features that present users with some sort of onscreen controls besides the typical buttons and menus found in a browser. It is important that these controls be operable through different methods, to accommodate as many people as possible. Computer users with disabilities frequently utilize input devices other than a mouse, since using a mouse requires both sight and manual dexterity. A person who is blind, for instance, might rely upon the keyboard, while someone with a mobility impairment might use a head-mounted pointing device. While Web browsers themselves can be controlled through these methods, additional interfaces may not have the same functionality. A common example found on museum Web sites is an image enlargement system that allows visitors to view works of art in detail. Depending upon the technology, users may be required to click the mouse on the image itself to zoom in. If so, this feature may be difficult for people with certain disabilities to use.

In the process of selecting an image enlargement system for the Virtual Museum Tour, keyboard operability was a primary concern. Many popular technologies failed in this respect, but a suitable product was found in the EyeSpy™ Image Server from AXS Technologies (http://www.axs-tech.com/). It allows visitors to use a mouse to click on the image, but it also provides a keyboard-accessible interface (Figs. 6 and 7).

Fig. 6: Frans Geubels (1535 - 1590) Flemish, KING ABIMELECH RESTORES SARAH TO HER HUSBAND, ABRAHAM, around 1560 - 1570, Tapestry: dyed wool and silk, 166 x 185 inches, Gift of Mr. Robert Badenhop, 1952.10

Fig. 7: Frans Geubels (1535 - 1590) Flemish, KING ABIMELECH RESTORES SARAH TO HER HUSBAND, ABRAHAM (detail)

Conclusions

When considering the topic of Web accessibility, it is beneficial to note how the addition of ramps and automatic doors have made access to museum buildings easier not only for people with disabilities, but also for all visitors. A similar phenomenon is likely to take place as museums improve the accessibility of their Web sites. By observing the WAI Guidelines, designers will make their pages more usable by everyone. For instance, text transcripts and described videos can be used by those who do not have the computer hardware or software to play multimedia,

and by people with a slow Internet connection. Likewise, visual descriptions may be appreciated even by people with normal eyesight, since the descriptions point out details that they might not have noticed. By incorporating the WAI Guidelines into their design procedures, museums will take a major step toward accomplishing the goal of making art accessible to everyone.

Acknowledgements

The Accessible Arts! program at Wright State University operates with funding from the Rehabilitation Services Administration of the U.S. Department of Education, and in collaboration with a consortium of area arts organizations and businesses.

Thanks to Alan Woods and Nancy Van Voorhis for their informative audio description workshop; to Nancy Van Voorhis and Nancy Mitchell for writing numerous visual descriptions; and to Mike Paciello for tips on the implementation of visual descriptions in Web pages.

References

AXS Technologies EyeSpy™ Image Server (2000). Consulted January 14, 2001. http://www.axs-tech.com/

National Center for Accessible Media Access to Rich Media Project (2000). Rich Media Accessibility: Resource Center for Developers. Last updated December 6, 2000, consulted January 3, 2001. http://main.wgbh.org/wgbh/pages/ncam/webaccess/arm/index.html

Organization for the Advancement of Structured Information Standards (1989). Code for the Representation of the Names of Languages. Last updated July 15, 1998, consulted January 8, 2001. http://www.oasis-open.org/cover/iso639a.html

World Wide Web Consortium HTML 4.01 Specification (1999). Objects, Images, and Applets in HTML documents. Last updated December 24, 1999, consulted January 3, 2001. http://www.w3.org/TR/html4/struct/objects.html#adef-alt

World Wide Web Consortium Web Accessibility Initiative (1999). Web Content Accessibility Guidelines 1.0. Last updated May 5, 1999, consulted January 2, 2001. http://www.w3.org/TR/WAI-WEBCONTENT/

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

NOTICE

Reproduction Basis

[X] This document is covered by a signed "Reproduction Release (Blanket)" form (on file within the ERIC system), encompassing all or classes of documents from its source organization and, therefore, does not require a "Specific Document" Release form.

[ ] This document is Federally-funded, or carries its own permission to reproduce, or is otherwise in the public domain and, therefore, may be reproduced by ERIC without a signed Reproduction Release form (either "Specific Document" or "Blanket").